AF
JPW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

JOSEPH G. SUPINA et al.

Group Art Unit: 3618

Examiner: Bridget D. Avery

Serial No.: 10/605,315

Filed: September 22, 2003

For: HYBRID VEHICLE POWERTRAIN WITH IMPROVED REVERSE DRIVE PERFORMANCE

Attorney Docket No.: 81044241/FMC1531PUS

RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

It is indicated in the Notification of Non-Compliant Appeal Brief that the Appeal Brief lacks a concise explanation of the subject matter defined in each claim involved in the appeal. In accordance with MPEP § 1205.03(B), Applicants now present the following summary of the subject matter defined by claims 1, 2 and 11, which are independent claims and the following summary of the subject matter defined by claims 3-10, which are dependent claims.

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8 (FIRST CLASS MAIL)

I hereby certify that this paper, including all enclosures referred to herein, is being deposited with the United States Postal Service as first-class mail, postage pre-paid, in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, U.S. Patent & Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 on:

December 29, 2006	Donald J. Harrington	Donald J. Harrington
Date of Deposit	Name of Person Signing	Signature

SUMMARY OF THE CLAIMED SUBJECT MATTER OF THE INDEPENDENT CLAIMS

The limitations in each independent claim are separately listed in the following claim chart. The limitations are identified by reference numerals in the drawings. The location in the specification where each limitation is described has been identified by paragraph number, by line number, or by both.

Claim 1 defines the species shown in Figure 2, claim 2 defines the species shown in Figure 3, and claim 11 is generic to both species.

CLAIM 1 (See Figure 2)

Limitations in Claim	Reference to Specification
A hybrid-electric wheeled vehicle powertrain comprising an internal combustion engine (54 in Fig. 2), an electric motor (24 in Fig. 2), an electric generator (40 in Fig. 2) and a battery (18 in Fig. 1);	Paragraphs [0010], [0034], [0035] and [0036] describe the structural relationship of the powertrain elements. A decoupling of the ring gear from the countershaft gearing is described in paragraph [0034], beginning at line 3. The function of the brake 60, when the engine drives the generator to charge the battery when the motor is operating in reverse, is described in paragraph [0034] beginning at line 5. The function of the brake 60, when the generator is used as a starter motor to start the engine, is described in paragraph [0035], lines 1-3.
the electric motor (24 in Fig. 2), the electric generator (40 in Fig. 2) and the battery (18 in Fig. 1) being electrically connected (Figs. 1 and 1a) to form an electrical power source;	The motor, the generator and the battery are coupled, as indicated by the high voltage bus shown in Figure 1. This provides an electrical power source in addition to the mechanical power source of the engine. See paragraphs [0021] and [0022].

a geared transmission (46) defining power flow paths to vehicle traction wheels (14 in Fig. 1), the geared transmission having a first element (52 in Fig.2) connected drivably to the engine and a second element (48 in Fig. 2) connected drivably to the motor (74);

The power flow paths defined by the geared transmission are described with reference to Figure 1a in paragraph [0028]. Figure 1a is a concept diagram of the power flow paths for the transmission structure of Figure 1, which have a counterpart in the embodiments of Figures 2 and 3. The counterpart elements are described in paragraph [0029] beginning at line 3.

a rotor (44 in Fig. 2) for the generator (40) being connected to a third element (50) of the geared transmission; and

The rotor 44, shown in Figure 2, is described in paragraph [0029] beginning at line 3 and in paragraph [0030].

a reaction brake (60 in Fig. 2) for anchoring the second element (48) of the geared transmission as the engine (54) drives the electric generator during operation of the powertrain in a reverse driving power delivery mode, the electric motor (74) being drivably connected through the geared transmission to the vehicle wheels;

The reaction brake 60 in Figure 2 is described in paragraph [0029] beginning at the last sentence of that paragraph. The electric motor 74 is connected drivably to the traction wheels, as indicated at paragraph [0031] beginning at line 3.

the driving connection of the second element (48) of the geared transmission to the motor (74) comprising a clutch (62 in Fig. 2) between the second element of the geared transmission and a torque output element of the powertrain (70,72) whereby the motor (74), with the clutch (62) disengaged, is isolated from the second element during reverse drive;

The clutch 62, which connects the ring gear 48 to the power output gear 64, is described in paragraph [0031], lines 1-3 and in paragraph [0034], beginning at line 3. With the clutch 62 disengaged, the motor 74 is isolated from ring gear 48 when the motor 74 is driven in a reverse direction during reverse drive of the vehicle.

the reaction brake for anchoring the second element (48) of the geared transmission being released and the clutch (62) being engaged during operation of the powertrain in a split-power delivery mode in a forward driving direction.

The second element of the planetary gear unit 46, shown at 48, is anchored by the brake 60. If the brake 60 is released, the planetary gear unit 46 functions in the same fashion as the planetary gearing 20 of the embodiment of Figure 1. The motor and the generator are electrically coupled to

the battery as a parallel torque delivery path to the wheels is established. This is described in paragraph [0031].

CLAIM 2 (See Figure 3)

Limitations in Claim	Reference to Specification
A hybrid-electric wheeled vehicle powertrain comprising an internal combustion engine (54′ in Fig. 3), an electric motor (74′ in Fig. 3), an electric generator (40′, 44 in Fig. 3) and a battery (18 in Fig. 1);	The engine, the motor, the generator and the battery are described in paragraph [0010].
the electric motor (74′), the electric generator (40′) and the battery (18) being electrically connected to form an electrical power source;	The electrical power source comprising the motor, the generator, and the battery is described in paragraphs [0010], [0020] and [0021], as well as elsewhere in the specification.
a geared transmission (48′, 50′, 52′) defining power flow paths to vehicle traction wheels, the geared transmission having a first element (52′) connected drivably to the engine and a second element (48′) connected drivably to the vehicle traction wheels (14 in Fig. 1);	The geared transmission of Figure 3 is described in paragraph [0037], which refers to counterpart elements of the design of Figure 2.
a rotor (44′) for the generator being connected to a third element (50′) of the geared transmission; and	The rotor 44′, shown in Figure 3, is described in paragraph [0031], which refers to the counterpart elements of the design of Figure 2.

a first clutch (88) selectively connecting two elements (48′ and 50′) of the geared transmission thereby establishing a direct drive between the engine (54′) and the electric generator (40′, 44′) as the engine drives the electric generator during operation of the powertrain in a reverse driving direction, the electric motor (74′) being drivably coupled through the geared transmission to the vehicle wheels (14);	The clutch 88 is described in paragraphs [0037] and [0038]. The other elements included in this limitation have counterpart elements in the design of Figure 2, as indicated in paragraph [0037].
the driving connection of the second element (48′) of the geared transmission to the vehicle traction wheels (14) comprising a second clutch (90) between the electric motor (74′) and the gear elements of the geared transmission, the second clutch being disengaged and the first clutch being engaged during reverse drive operation whereby the engine drives the generator (40′, 44′) to charge the battery through a torque flow path that is isolated from a reverse drive motor torque flow path.	The clutch 90 is disengaged during reverse drive and the first clutch 88 is engaged during reverse drive. This permits the engine 54′ to drive the generator to charge the battery. The torque flow path from the motor 74′ to the wheels is isolated by the clutch 90, which is disengaged, whereby the engine can drive the generator to charge the battery.

CLAIM 11 (See Figures 2 and 3)

Limitations in Claim	Reference to Specification
A hybrid-electric wheeled vehicle powertrain comprising an internal combustion engine (54, 54′), an electric motor (74, 74′), an electric generator (40, 40′, 42′) and a battery (18 in Fig. 1);	The hybrid electric vehicle powertrain is comprised of the elements that are common to the embodiment of Figure 2 and the embodiment of Figure 3, including the motor described in paragraphs [0031] and [0033], as well as elsewhere in the specification.
the electric motor, the electric generator and the battery being electrically connected to form an electrical power source;	The motor, the generator and the battery are electrically connected, as described in paragraph [0031] in the last sentence of that paragraph.

a geared transmission (46, 48′, 50′, 52′) defining power flow paths to vehicle traction wheels (14 in Fig. 1), the geared transmission having a first gear element (50, 50′) connected to the engine and a second gear element (48, 48′) connected drivably to the motor (74, 74′);	The geared transmission comprises elements that are described in paragraph [0029], as well as elsewhere in this specification.
a rotor (44, 44′) for the generator being connected to a third element (50, 50′) of the geared transmission;	The rotor 44, 44′ is connected to the third element, (the sun gear of the planetary gear unit), which are described in paragraph [0029] as well as elsewhere in the specification.
means for establishing a driving connection between the engine (54, 54′) and the generator through the gear elements (48,48′; 50,50′; 52,52′) during operation of the powertrain in a reverse driving power delivery mode, the electric motor (74, 74′) being drivably connected to the vehicle traction wheels (14); and	The means for establishing a driving connection between the engine and the generator through the gear elements during operation in reverse driving power delivery mode includes the clutch 62 of the Figure 2 embodiment and the clutch 88 of the Figure 3 embodiment.
means for isolating a torque flow path between the motor and the vehicle traction wheels from a torque flow path between the engine and the generator.	The means for isolating the torque flow path between the motor and the vehicle traction wheels includes the clutch 62 of the Figure 2 embodiment and the clutch 90 of the Figure 3 embodiment.

SUMMARY OF THE CLAIMED SUBJECT MATTER OF DEPENDENT CLAIMS

The limitations in each dependent claim are separately listed in the following claim chart. The limitations are identified by reference numerals in the drawings. The location in the specification where each limitation is described has been identified by paragraph, by line number, or both.

Claims 4, 6, 7, and 9 define the species shown in Figure 2. Claims 3, 5, 8, and 10 define the species shown in Figure 3.

CLAIM 3 (See Figure 3)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 2 wherein the first clutch (88) connects the first and second gear elements (52' and 48') of the geared transmission to achieve a direct drive in a torque delivery path between the engine (54') and the generator (40') as the engine (54') drives the generator to charge the battery (18 in Figure 1).	The clutches 88 and 90 are described in paragraph [0037] and paragraph [0038], lines 1-5.

CLAIM 4 (See Figure 2)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 1 wherein the geared transmission has a planetary gear set (46) including a sun gear (50) connected to the generator (40), a ring gear (48), and a carrier (52) connected to the engine (54);	The planetary gear set is described in paragraphs [0029], [0030], and [0031], lines 1-3.
the clutches (62), when engaged, completing a geared torque flow path between the engine (54) and the vehicle traction wheels (14 in Figure 1) during forward drive operation;	The clutch (62) is described in paragraphs [0031] and [0034].
the reaction brake (60) anchoring the ring gear (48) when the generator (40) is driven by the engine (54).	

CLAIM 5 (See Figure 3)

Limitations in Claim	
The hybrid-electric wheeled vehicle powertrain set forth in claim 2 wherein the geared transmission has a planetary gear set	including a ring gear (48'), a sun gear (50') connected to the generator (40') and a carrier (52') connected to the engine (54');

the second clutch (90) completing a torque flow path between the ring gear (48') and the vehicle traction wheels (14 in Figure 1) during forward drive operation.	Reference to Specification The planetary gear set is described in paragraphs [0037] and [0038]. Forward drive operation is described in paragraph [0038], lines 1-5, and [0039], lines 1-4.

CLAIM 6 (See Figure 2)

Limitation in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 1 wherein the reaction brake (60) acts on the second element (48) of the geared transmission to effect engine starting torque delivery from the generator (40) to the engine (50) as the generator (40) functions as an engine starter torque source.	This engine starter motor function is described in paragraph [0035] and in paragraph [0012].

CLAIM 7 (See Figure 2)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 4 wherein the reaction brake (60) acts on the second element (48) of the geared transmission to effect engine starting torque delivery from the generator (40) to the engine (54) as the generator (40) functions as an engine starter torque source.	The engine starter motor function is described in paragraph [0035] and in paragraph [0012].

CLAIM 8 (See Figure 3)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 5 wherein the first clutch (88) connects the carrier (52') and the ring gear (48') of the geared transmission to achieve a direct drive in a torque delivery path between the engine (54') and the generator (40') as the engine (54') drives the generator (40') to charge the battery (19 in Figure 1).	The direct drive in the torque delivery path is described in paragraph [0038], lines 1-5.

CLAIM 9 (See Figure 2)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 1 wherein the geared transmission includes countershaft gears (64, 66, 68, 76) in a power flow path between the motor (74) and the torque output element (70,72) powertrain and between the second element (48) of the geared transmission and the motor (74).	The countershaft gears are described in paragraph [0031].

CLAIM 10 (See Figure 3)

Limitations in Claim	Reference to Specification
The hybrid-electric wheeled vehicle powertrain set forth in claim 2 wherein the geared transmission includes countershaft gears (64', 66', 68', 76') in a power flow path between the motor (74') and the traction wheels (14 in Figure 1) and between the second element (48') of the geared transmission and the motor (74').	The countershaft gears are described in paragraphs [0037] and [0031].

ADDITIONAL COMMENTS

The design of Figure 2 functions in a manner similar to the function of the powertrain in Figure 1 when clutch 62 is engaged. Engine power is delivered to the carrier 52 and sun gear 50 is connected directly to the generator. This establishes a power split, parallel operating mode as described in paragraph [0031]. This is similar to the operation of the powertrain illustrated in Figure 1. Similarly, when the clutch 90 of the embodiment of Figure 3 is engaged and the clutch 88 is disengaged, engine power is delivered to the carrier 52'. A split power delivery thus occurs since the generator is connected at this time to the sun gear 50'. Power then is delivered through the countershaft gearing from both the motor and the engine during forward drive.

In the design of Figure 1, it is necessary, if the battery state of charge is low and the engine is used to charge the battery, for the motor to generate enough power to overcome the ring gear torque while the vehicle moves in reverse. This condition is not present, however, in the designs of Figures 2 and 3. In the case of the design of Figure 2, the clutch 62 is open during reverse drive, which isolates the motor power flow path from the engine power flow path. In the case of the design of Figure 3, this isolation occurs by opening clutch 90. It is not necessary in either the design of Figure 2 or the design of Figure 3 for the motor to generate enough power to overcome ring gear torque while moving the vehicle in reverse under these conditions.

In the case of the design of Figure 2, the brake 60 anchors the ring gear 48 to provide a reaction point as the engine drives the generator to charge the battery while the motor is operating in reverse. The generator then can supply electric power to the motor and any excess power generated by the generator can be stored in the battery.

If the generator is used as a starter motor to start the engine, the brake 60 can be applied without affecting the power flow from the motor to the traction wheels. At this

time, the clutch 62 is released. In the case of the design of Figure 3, the engine can be started using the generator as a starter motor as the clutch 88 is applied and the clutch 90 is released. This is done without affecting reverse drive performance since the reverse power flow path is isolated from the engine power flow path at this time.

There is no need for the electric motor to supply reaction torque to the ring gear when the generator acts as a starter motor for the engine.

Clearly, the functions described in the foregoing paragraphs and the structure needed to execute those functions are not disclosed in the references, especially since the designs of the references include only a single electric machine. Applicants' claims define that structure. Applicants' invention, in contrast to the reference designs, includes two electric machines. Any attempt to apply the teachings of the references to the invention as defined by Applicants' claims would require a double inclusion of elements. The motor/generator 14 of the '670 reference and the motor/generator 5 of the '155 reference cannot perform the functions of the separate motor and separate generator of Applicants' invention.

Respectfully submitted,

JOSEPH G. SUPINA et al.

By: _____
Donald J. Harrington
Reg. No. 17,427
Attorney for Applicants

Date: December 29, 2006

BROOKS KUSHMAN P.C.
1000 Town Center, 22nd Floor
Southfield, MI 48075-1238
Phone: 248-358-4400
Fax: 248-358-3351